

Notes on the Life History and Baja California Distribution of *Chlorostrymon simaethis sarita* (Skinner) (Lepidoptera: Lycaenidae)

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Abstract. The early stages of *Chlorostrymon simaethis sarita* (Skinner) are herein described. Larval behavior in association with the host plant *Cardiospermum corindum* Linnaeus (Sapindaceae) is briefly discussed. Additionally, data regarding the insect's temporal and spatial distribution in Baja California, Mexico, are presented.

Introduction

Chlorostrymon simaethis (Drury) is an exquisite little neotropical hair-streak that occurs from Florida and Texas south through the Antillies, Mexico, Central and South America (Nicolay, 1980). Although commonly associated with balloon vine (*Cardiospermum* Linnaeus) (Sapindaceae) throughout its entire range, the early stages of *C. simaethis* are seldom encountered. Zikan (1956) briefly described the last instar larva and pupa from specimens collected and reared near Itatiaia, Brasil.

In Baja California, Mexico, the subspecies *C. simaethis sarita* (Skinner) is occasionally moderately abundant. Additionally, balloon vine has a rather widespread distribution throughout the peninsula of Baja California and on the adjacent islands (Wiggins, 1980), with 3 species present, all in the genus *Cardiospermum*. The plant's fruiting bodies are round or angular, inflated, papery, three-chambered pods 2-4 cm long, 3-5 cm wide, and strongly veined (Coyle and Roberts, 1975). Each chamber usually bears a single pea-like seed, although in some cases only one or two of the three seeds develop to maturity.

Larvae of *C. simaethis sarita* were discovered inside the pods of a large *Cardiospermum corindum* Linnaeus at a locality approximately 10 km north of Rosarito, Baja California Norte, 8 April 1982, by David Faulkner and the author. Almost all stages of larval development were present.

Early Stages

First instar. Length 2-4 mm. Body eruciform, light translucent green with a whitish overcast. No conspicuous markings. **Second instar.** Length

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Fig. 1. Last instar larva of *Chlorostrymon simaethis sarita* inside pod of *Cardio-spermum corindum*.

5-6 mm. Body light green to gray-green with a faint mid-dorsal darker stripe. No additional markings. **Third instar.** Length 7-8 mm. Body slug-shaped, color quite variable from light olive green to light brown, a darker green longitudinal stripe running the entire mid-dorsal length. Body occasionally with minute reddish speckling. At mid-dorsal crest of each segment 2-8 is a wedge-shaped reddish brown mark and a slight ovaloid indentation. Marks usually well defined but may be quite faint. Mark on third segment enlarged, extending laterally almost over entire dorsal surface of that segment. Mark on second segment extremely light. A faint blackish gray longitudinal stripe on each side of the body. Head concolorous with body. **Final instar.** Length 9.0-11.5 mm; width 4.5 mm. Color and markings variable. Body color from light green to light brown, becoming powdery brick red as larva approaches pupation. Most of body covered with fine, short black hairs. Each segment with a black semi-longitudinal dash midway between the apex and the prolegs; the dashes together forming an irregular, wavy, longitudinal stripe on each side of the larva. A mid-dorsal greenish black stripe runs the length of the larva, and a

small, variable faint-to-dark reddish brown oval-shaped marking occurs on each side of the stripe at the posterior crest of each segment 2—8. The markings together superficially appear as a reddish brown longitudinal stripe down the mid-dorsal apex. Mark on the third segment enlarged, extending laterally. Spiracles unmarked. Head, when extruded, reveals two conspicuous, small black ocelli. Mandibles brownish black. **Pupa.** Length 7.5-8.5 mm; width 4.5 mm. Short, stout, and rounded. Color variable, light brown to dark grayish brown, mottled with black and brown splotches. Ventral surface much lighter. Dark black markings inconsistently border the wing cases. A black comma-shaped spot on each side of the body near the region of the head. A faint black mid-dorsal longitudinal stripe; and a thin, black lateral stripe where abdominal segments six and seven join. Entire body sparsely covered with fine light brown hairs, wing cases bare.

Adults emerged as follows: 2♀♀, 4 May 1982; 1♀, 5 May 1982; 2♀♀, 8 May 1982; and 1♀, 10 May 1982. Five specimens are deposited in the collection of the San Diego Natural History Museum, and one specimen was given to Glenn Gorelick, Sierra Madre, California.

The molts were determined by observation of distinct changes in size of the larvae accompanied by subtle changes in coloration and markings. No head capsules were observed or recovered, and no immature stages were preserved.

Behavioral Notes

Eggs are apparently deposited singly on the developing flower heads. Larval development takes place entirely within the fruiting pods. First instar larvae bore into a developing green seed, leaving behind a small entrance hole. Feeding initially takes place inside the seed and the frass is generally deposited on the exterior of the seed. The larva eventually consumes all of the seeds within a single pod, moving between the chambers of the pod by boring through the membranous structures dividing them. Occasionally even the membrane is consumed by the larva. There is never more than one larva within a single pod. Cannibalism might account for this fact since many lycaenid larvae, under crowded conditions, are known to devour their siblings (Downey, 1962). However, no cannibalism was observed. A single egg per bud is suggested by the occurrence of a single larva within a pod. Externally there is no difference in the appearance of inhabited and uninhabited pods.

After all the seeds within the pod have been eaten, the mature larva bores out of the pod and crawls away to pupate. Pupation occurs in debris and loose soil beneath the host without a girdle-string attachment. Under laboratory conditions, pupation of progeny of the spring brood lasted from 14 to 17 days.

It is not known whether a larva can undergo complete development

within a single pod, and the data available are inconclusive. Pods which had an exterior hole contained no larvae and were full of frass, indicating that the hole is an "exit" hole only, implying the use of a single pod. This was, however, contradicted by the fact that under laboratory conditions, mature-appearing larva continued to feed if offered a second opened pod. Also, Zikan (1956) reported the use of multiple pods of *Cariospermum halicacabum* Linnaeus. The contents of two pods seemed to be the absolute maximum required for complete larval development.

Observations by Fred T. Thorne (personal communications) indicate that newly hatched first instar larvae refused to feed on foliage of *Cardiospermum halicacabum* even when offered tender young growth. As *C. halicacabum* has been documented by Zikan to be a suitable host, this further suggests that the larval diet is indeed limited to the developing seeds. Although many lycaenid larva feed on vegetative parts of their respective hosts, several feed exclusively on plant reproductive structures such as flowers and seeds (Downey, 1962). The latter is the case with *C. simaethis sarita*.

Distributional Notes

Chlorostrymon simaethis sarita occurs the entire length of the peninsula of Baja California, Mexico (Fig. 4). Captures have been recorded from the cape region of Baja California Sur to the Sierra San Pedro Martir in Baja California Norte. Strays are known from as far north as the Colorado Desert in San Diego County and Palm Springs in Riverside County, California, much to the north of the known range of the host. The single confirmed host in Baja California is the widely ranging introduced *Cardio-*

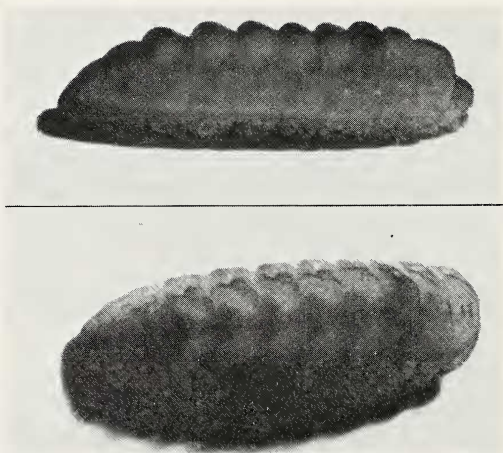


Fig. 2. Last instar larva of *C. simaethis sarita*, lateral view.

Fig. 3. Last instar larva of *C. simaethis sarita*, dorsal view.

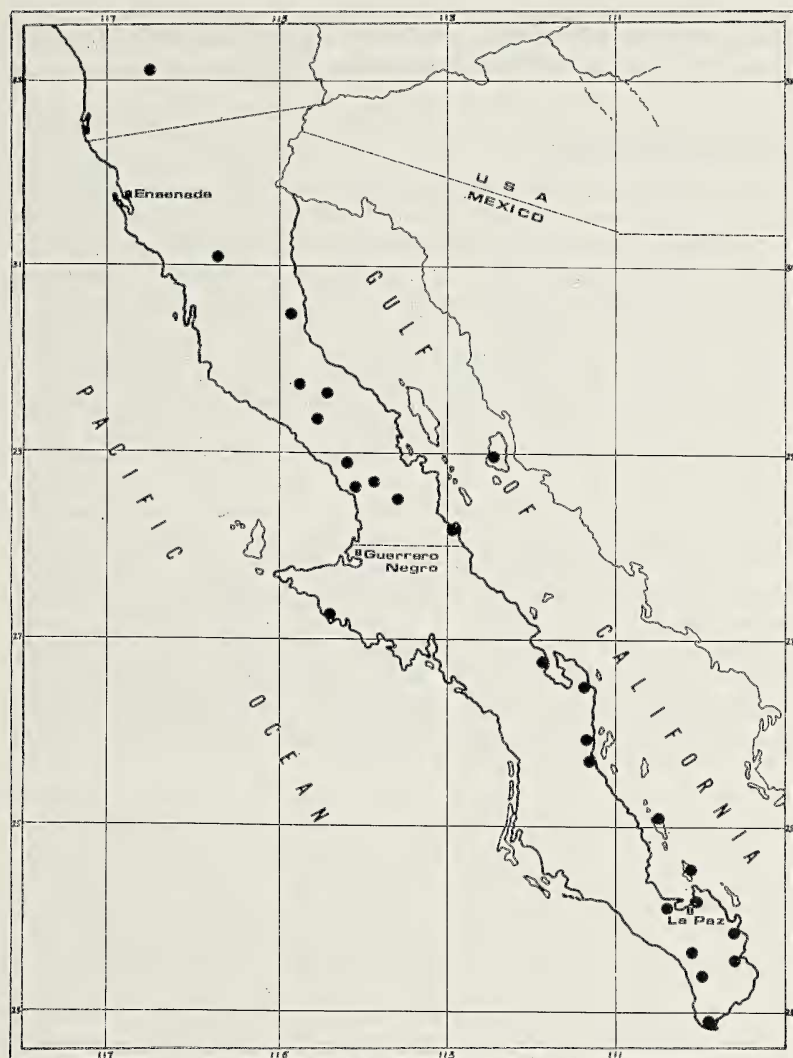


Fig. 4. Spatial distribution of *C. simaethis sarita* in Baja California, Mexico.

spermum corindum. It is not known whether *C. simaethis sarita* utilizes the other two species of *Cardiospermum*, both of which are endemic to Baja California.

In the northern arid region of the peninsula *C. simaethis sarita* appears to be capable of three broods, with the adult emergence probably dictated by rainfall. Capture records indicate flights in late March to mid-April mid-June to mid-July, and again in September through November. In the cape

region of Baja California Sur specimens have been recorded in every month from October to March representing at least two broods.

Specimens Examined

Depositories abbreviated in the text are as follows: CAS, California Academy of Sciences, San Francisco, California; CI, College of Idaho, Caldwell, Idaho; HF, Allan Hancock Foundation, University of Southern California, Los Angeles; SDNHM, San Diego Natural History Museum, San Diego, California, and RB, Richard Breedlove, San Diego, California.

MEXICO: BAJA CALIFORNIA NORTE: Punta Prieta, 2 F, 28 March 1935 (CAS), 1 F, 23 Dec. 1976 (D. Lindsley, SDNHM); Sulfur mine S San Felipe, 2 F, 1 M, 12 Nov. 1967 (D. Patterson, CAS); 7 mi W Las Arrastras, 3 F, 18 M, 4 Nov. 1967 (D. Patterson, CAS); 14.9 mi N Laguna Chapala, 1 F, 1 M, 3 April 1973 (D. Patterson, CAS); 7 mi SW Mission San Borja, 1 M, 31 March 1973 (Donohoe & Patterson, CAS), 1 F, 3 M, 30 March 1973 (J. Powell, CAS); 7 mi E Rancho Rosarito, 16 F, 11 M, 30 March 1973 (Donohoe & Patterson, CAS); 9 km NW Rancho Santa Inez, 1 M, 12 July 1979 (A. Chu, CI); Rancho Santa Inez, 1 F, 14 June 1979 (J. Miles, CI); Las Encinas, Sierra San Pedro Martir, 1 M, 17 June 1980 (J. Brown, SDNHM), 1 M, 13 July 1980 (J. Brown, SDNHM); vic. ent. Parque Nacional Sierra San Pedro Martir, 1 F, 22 June 1979 (J. Brown, SDNHM); Bahia San Francisquito, 1 F, 3 April 1947 (C. Harbison, SDNHM); Isla Tiburon, Golfo de California, 2 F, 3 M, 19 March 1962 (C. Harbison, SDNHM); 2.1 mi S Rosarito, 1 M, 23 March 1981 (Faulkner & Andrews, SDNHM); 10 km N Rosarito, 2 F, ex-larvae, em: 4 May 1982, 1 F, ex-larva, em: 5 May 1982, 2 F, ex-larvae, em: 8 May 1982, 1 F, ex-larva, em: 10 May 1982 (J. Brown, SDNHM).

BAJA CALIFORNIA SUR: Espiritu Santo Island, 2 F, 7 March 1928 (Craig, CAS), 2 F, 7 M, 22 Feb. 1936 (J. Garth, HF), 1 F, 11 Feb. 1940 (J. Garth, HF), 1 F, 9 M, 19 Feb. 1932 (J. Garth, HF); 10 mi N Todos Santos, 4 F, 9 M, 26 Dec. 1958 (Leech, CAS); Coyote Cove, Bahia Concepcion, 1 F, 1 Oct. 1941 (CAS); 13.1 mi NW La Paz, 2 M, 3 Jan. 1959 (Leech, CAS); Cabo San Lucas, 1 F, 17 Jan. 1959 (Leech, CAS), 2 F, 31 Dec. 1978 (Rude, CAS); 5.6 mi SE San Perdito, 1 F, 6 Oct. 1981 (D. Faulkner, SDNHM); 12.2 mi SE San perdito, nr Rancho Saucito, 2 F, 8 Oct. 1981 (Faulkner & Andrews, SDNHM); 14 mi N Todos Santos, 1 M, 4 Oct. 1981 (Brown & Faulkner, SDNHM); 29.9 mi S Loreto, 1 F, 11 Oct. 1981 (Faulkner & Andrews, SDNHM); 5 mi W Loreto, 8 F, 27 Dec. 1976 (D. Lindsley, SDNHM); Bahia Concepcion, 1 F, 29 Dec. 1976 (D. Lindsley, SDNHM); 2 mi W Loreto, 1 F, 4 M, 12 Dec. 1976, 2 mi SW Loreto, 1 F, 3 M, 4 Dec. 1977, 2-3 km SW Loreto, 1 F, 29 Nov. 1977, 1 F, 30 Nov. 1977 (all G. Forbes, SDNHM); Hotel Mulege, 1 F, 23 March 1974 (G. Forbes, SDNHM); La Paz, 1 F, 9 Nov. 1952 (SDNHM), 1 F, 1 M, 29 Nov. 1979 (Brown & Faulkner, SDNHM); Cabo San Lucas, 1 F, 11 Nov. 1952 (SDNHM), Hotel Finisterra, Cabo San Lucas, 3 F, 1 M, 30 Nov. 1979 (Brown & Faulkner, SDNHM), 4 F, 1 M, 28 Nov. 1980 (Brown & Brown, SDNHM); San Bartolo, 3 F, 1 M, 30 Nov. 1979 (Brown & Faulkner, SDNHM).

CALIFORNIA: RIVERSIDE CO.: Palm Springs, 1 F, 9927 (SDNHM).

SAN DIEGO CO.: Mason Valley, Anza Desert, 1 M, 8 Oct. 1967 (G. Forbes,

SDNHM); Anza Desert, Vallecitos, 1 M, 11 Nov. 1967 (R. Breedlove, RB); Dexter Peak, Descanso, 1 F, 21 May 1966 (R. Breedlove, RB).

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